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09/600,279	10/26/2001	Mark A. Prelas	Q43649	1508
7590 04/12/2004			EXAMINER	
Sughrue Mion Zinn Macpeak & Seas 2100 Pennsylvania Avenue N W Washington, DC 20037-3213			DIAMOND, ALAN D	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 04/12/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/600,279

Applicant(s)

PRELAS ET AL.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Priority***

1. On page 1 of the instant specification, the first sentence needs to be corrected so as to properly reflect the continuity data for the instant application. In particular, the first sentence on page 1 should read as follows: "The present application is a 371 of PCT/US99/00380 filed January 15, 1999, which claims the benefit of provisional application 60/071,667 filed January 16, 1998."

### ***Specification***

2. The disclosure is objected to because of the following informalities: On page 11, at line 13, the term "stroage" should be changed to "storage". On page 17, at line 14, the term "now U.S. Patent 5,597,762" should be inserted after "08/313,641".

Appropriate correction is required.

### ***Claim Objections***

3. Claim 61 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 61 does not further limit claim 60 because claim 60, by way of claim 33, recites that the crystalline films made from wide band-gap materials, have the ability to store in at least one of interstitial voids and inter-crystal grain boundaries, the isotope. Thus, a recitation in claim 61 that the wide band-gap materials have the ability to store the isotope, does not further limit what is already present in claim 60.

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4. Claims 32, 42, 48, 59, and 60 are objected to because of the following informalities: In claim 32, at line 3, there should be a comma after the word "mismatch". In claim 42, at line 1, the word "film" should be changed to "films". In claim 48, at line 2, the word "direct" should be changed to "directs". In claim 59, at line 2, the term "100ppm" should be changed to "100 ppm". In claim 60, at line 3, the word "and" should be inserted after the term "molecular hydrogen,". Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 13, 16, 18, 19, and 31-62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 13, at line 2, it is not clear what is meant by "1,500,00".

In claim 16, at line 2, it is not clear exactly which film is being referred to by the term "at least one film". It is suggested that said term be changed to "at least one of the films".

In claim 18, at lines 1-2, it is not clear which films are being referred to by the term "a plurality of stacked films". It is suggested that said term be changed to "the stacked films".

Claim 19 is indefinite because the term "said plurality of stacked films" at line 2 lacks positive antecedent support in claim 1. It is suggested that said term be changed to "the stacked films".

Claim 31 is indefinite because "the interstitial voids" at line 2, "the carbon atoms" at lines 2-3, and "said radioactive isotope" at line 3-4 lack positive antecedent support in claim 28. It is suggested that both occurrence of the word "the" at line 2 be deleted, and the word "said" at line 3 also be deleted.

Claim 32 is indefinite because the term "said material" at line 3 lacks positive antecedent support in claim 28. It is suggested that said term be changed to "said crystalline storage medium".

In claim 33, at line 9, it is not clear what is being referred to by the term "the voids and crystal structure". It is suggested that said term be changed to "at least one of the interstitial voids and inter-crystal grain boundaries". The same applies to dependent claims 34-62.

Claim 33 is also indefinite because it is not clear which material is being referred to by the term "said material" at line 10. It is suggested that said term be changed to "said radionuclide material". The same applies to dependent claims 34-62.

In claim 52, at line 2, it is not clear which materials are being referred to by the term "said materials" at line 2. It is suggested that said term be changed to "said device".

Claim 54 is indefinite because "the emitted photons" at lines 2-3 lack positive antecedent support in claim 33. It is suggested that the word "the" be deleted from line 2 of claim 54.

Claim 56 is indefinite because "loaded" at line 1 lacks positive antecedent support in claim 33. It is suggested that "loaded" be changed to "embedded".

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-62 rejected under 35 U.S.C. 103(a) as being unpatentable over Mannik et al, U.S. Patent 5,859,484.

Mannik et al teaches a radioisotope-powered semiconductor battery which, as seen in Figure 5, comprises two stacked cells (62,64) (see also col. 6, lines 14-42). Cell (62) comprises a semiconductor having an n-type layer (66) and a p-type layer (68) (see col. 6, lines 19-21). Cell (64) comprises a semiconductor having an n-type layer (74) and a p-type layer (76) (see col. 6, lines 22-23). The semiconductor for each cell can be crystalline, and the radioisotope can be occluded within the semiconductor of each cell by controlled diffusion (see col. 4, lines 5-30; and col. 5, lines 13-22). The crystalline semiconductor can be GaInAsP, which is a wide band-gap semiconductor material (see col. 4, line 15; and col. 6, line 12). The radioisotope can be as here claimed (see col. 4, lines 18-30). It is the Examiner's position that said radioisotope inherently generates nuclear particles that interact with the crystal atom electrons of the GaInAsP and generate bound electron-hole pairs that, when recombination occurs, yield photons. Said layers (74) and (76), when both doped with radioisotope, read on the instant crystalline films, and cell (62) then corresponds to the instant photovoltaic material. Alternatively, said layers (66) and (68), when both doped with radioisotope,

read on the instant crystalline films, and cell (64) then corresponds to the instant photovoltaic material. Alternatively, if only one of layers (74) and (76) is the GaInAsP, and one of the layers (66) and (68) is also GaInAsP, there would be plural crystalline films as here claimed, and then either cell (64) or (62) or both would read on the instant photovoltaic material. In place of GaInAsP, III-V semiconductors can be used, which encompass the instantly claimed GaN and AlN (see col. 4, lines 5-17). Mannik et al teaches the limitations of the instant claims other than the difference which is discussed below.

Mannik et al does not provide a specific example where said GaInAsP is doped with the radioisotope. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Mannik et al's radioisotope-powered semiconductor battery using crystalline GaInAsP doped with radioisotope because such is clearly within the scope of Mannik et al's disclosure.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following U.S. patents are hereby made of record:

2,713,644, 2,819,414, 4,039,839, 5,082,505, 5,396,141, 5,443,657, 5,606,213, 5,642,014, 5,597,762, 5,721,462, 6,238,812, and 6,479,743.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond  
March 29, 2004

Alan Diamond  
Primary Examiner  
Art Unit 1753

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.